

REMARKS

In the Office Action, claims 1-4 and 7 are rejected under 35 U.S.C. § 102; and claims 5, 6 and 17 are rejected under 35 U.S.C. § 103. Applicants believe that the rejections are improper for at least the reasons set forth below.

With respect to the rejection of claims 1-4 and 7, these claims are rejected as allegedly anticipated by U.S. Patent No. 5,672,439 ("Wilkinson"). The Patent office essentially asserts that Wilkinson discloses each and every feature of the claimed invention.

Of the pending claims at issue regarding the anticipation rejection, claim 1 is the sole independent claim. Claim 1 recites an electrochemical device. The device includes a gas diffusion electrode that includes a carbonaceous material and a catalytic layer that is formed on at least a portion of a surface of the carbonaceous material. The carbonaceous material has at least a first surface region and a second surface region wherein an amount of a catalytic layer that is formed on the first surface region is lesser than an amount of the catalytic layer formed on the second surface region. The electrochemical device further includes a proton conduction unit in contact with the first surface region of the gas diffusion electrode.

Applicants have discovered that the amount of the catalyst deposited on the surface area of the carbonaceous material facing the proton conduction unit can be provided in a smaller amount than the amount of catalyst on the surface area of the carbonaceous material facing a flow channel for the feed gas. In this regard, the amount of the catalyst that contacts the proton conduction unit can be effectively minimized, thereby enabling the total amount of the catalyst that is applied to the carbonaceous material to react more effectively with the gas diffusion electrode. Accordingly, the energy efficiency of the electrochemical device can be improved. See, Specification, page 3, lines 6-13.

In contrast, Applicants believe that the Wilkinson reference is distinguishable from the claimed invention. For example, nowhere does Wilkinson provide a gas diffusion electrode with a varying amount of catalytic material on two different surface regions as claimed. Indeed, the emphasis of the Wilkinson reference relates to a multiple layered structure where the catalytic layer is sandwiched between multiple electrode layers as shown in Figure 6 of Wilkinson. See also, Wilkinson, col. 7, lines 16-25. Thus, nowhere does Wilkinson provide that the catalyst amount can vary at different surface regions of the electrode and thus further fails to recognize

the improved effects that such configuration has on an electrochemical device as claimed and recognized by Applicants as discussed above.

Based on at least these reasons, Applicants believe that Wilkinson is deficient with respect to the claimed invention. Therefore, Applicants believe that Wilkinson fails to anticipate the claimed invention as defined by claims 1-4 and 7.

Accordingly, Applicants respectfully request that the anticipation rejection with respect to claims 1-4 and 7 be withdrawn.

In the Office Action, claims 5 and 6 are rejected under 35 U.S.C. § 103 in view of Wilkinson and further in view of Edie et al. In this regard, the Patent Office primarily relies on Wilkinson and thus relies on the remaining cited art to remedy the deficiency of same.

At the outset, the Wilkinson reference on its own is distinguishable with respect to the claimed invention for substantially the same reasons as discussed above. Claims 5 and 6 depend directly from claims 1 and thus incorporate the gas diffusion electrode features as claimed and discussed above. Therefore, on its own, Wilkinson is deficient with respect to the claimed invention for at least these reasons.

Further, Applicants do not believe that the Patent Office can rely solely on Edie et al. to remedy the deficiencies of Wilkinson. Indeed, the Patent Office merely relies on Edie et al. for its alleged teachings regarding carbon fibers that are composed of graphite crystallite wherein the fibers have a tubular structure along the fiber axis. Thus, even if combinable, Applicants do not believe that one skilled in the art would be inclined to modify Wilkinson in view of Edie et al. to arrive at the claimed invention. Therefore, Applicants respectfully submit that Wilkinson and Edie et al., even if combinable, fail to render obvious the claimed invention.

Accordingly, Applicants respectfully request that the obviousness rejection with respect to claims 5 and 6 be withdrawn.

In the Office Action, claim 17 is rejected under 35 U.S.C. § 103 as allegedly unpatentable over Wilkinson in view of U.S. Patent No. 5,728,485 ("Watanabe"). In this regard, the Patent Office primarily relies on Wilkinson and further relies on Watanabe to remedy the deficiencies of same.

Applicants believe that the obviousness rejection in view of Wilkinson and Watanabe is improper. Claim 17 recites an electrochemical device. The device includes a gas diffusion electrode including a carbonaceous material and a catalytic layer that is formed on at least a

portion of a carbonaceous material; and a proton conduction unit that contacts a gas diffusion electrode such that at least a portion of the carbonaceous material is embedded within the proton conduction unit wherein an amount of the catalytic layer is less in the embedded portion of the carbonaceous material than in a portion of the carbonaceous material that is not embedded within the proton conduction unit. As previously discussed, Applicants have discovered that the energy efficiency of the electrochemical device can be improved by concentrating a greater amount of the catalytic material as a part of the electrode and away from the proton conduction unit in contact with the electrode, such as having a less amount of the catalytic layer in a portion of the carbonaceous material of the gas diffusion electrode that is embedded in the proton conduction unit as claimed.

In contrast, Applicants believe that the cited art is distinguishable from the claimed invention as recited in claim 17. With respect to the primary Wilkinson reference, indeed, the Patent office even admits that Wilkinson fails to provide a carbonaceous material that is embedded within a proton conduction unit. See, Office Action, page 5. Clearly, Wilkinson further fails to provide an embedded portion of the gas diffusion electrode with a lesser amount of catalytic layer that is formed thereon as required by the claim 17. Thus, Wilkinson on its own is clearly distinguishable from the claimed invention.

Further, Applicants do not believe that the Patent Office can rely solely on Watanabe to remedy the deficiencies of Wilkinson. At the outset, the Patent Office merely relies on Watanabe for its alleged teaching regarding a proton conduction unit that is intertwined with catalyst-carrying carbon fibers. Thus, even if combinable, nowhere does Watanabe and Wilkinson disclose or suggest varying the amount of a catalytic layer on the gas diffusion electrode, such as a lesser portion that is embedded within the proton conduction unit as claimed. Moreover, Applicants question whether the Patent Office can reasonably equate the intertwining of catalytic materials and proton conduction material as disclosed in Watanabe with the embedded portion feature as claimed. Thus, even if combinable, Applicants do not believe that one skilled in the art would be inclined to modify Wilkinson in view of Watanabe to arrive at the claimed invention. Therefore, Applicants believe that Wilkinson and Watanabe, even if combinable, fail to render obvious the claimed invention as defined by claim 17.

Accordingly, Applicants respectfully request that the obviousness rejection with respect to claim 17 be withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

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